

Applic. No.: 09/917,549  
Amdt. Dated January 17, 2006  
Reply to Office action of October 17, 2005

REMARKS/ARGUMENTS

Reconsideration of the application is requested.

Claims 1-3, 5-6, and 8-10 remain in the application. Claims 4 and 7 have been cancelled.

In the section entitled "Claim Rejections - 35 USC § 103" on pages 2-4 of the above-mentioned Office action, claims 1-3, 5-6, and 8-10 have been rejected as being unpatentable over Ye et al. (US Pat. No. 6,080,529) in view of Subramanion et al. (US Pat. No. 5,986,344) under 35 U.S.C. § 103(a).

As will be explained below, it is believed that the claims were patentable over the cited art in their original form and the claims have, therefore, not been amended to overcome the references.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 1 calls for, inter alia:

etching the organic antireflection layer with an etching gas composition containing at least 80% hydrogen and nitrogen;

achieving a selectivity of more than 1:50 of the organic antireflection layer etching in relation to etching the

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semiconductor layer lying underneath the organic antireflection layer;

achieving an etching profile with an anisotropy factor of substantially 1; and

setting the etching gas composition with hydrogen and nitrogen for causing a vertical removal of the photoresist to correspond at most to an etching rate of the organic antireflection layer.

By employing the above features, the invention of the instant application achieves an improved etching performance of an organic antireflection layer, ensuring an highly accurate transfer of a photoresist mask to the organic antireflection layer without any loss of the organic antireflection layer material and less faceting of the photoresist layer on top of the organic antireflection layer. There is no reasonable expectation of this success by combining the teaching of Ye et al. and Subramanion et al.

Ye et al. teach the use of a hydrogen/nitrogen based etching chemistry for etching an organic based layer in case copper is used as a conductive layer underneath the organic based layer so as to reduce the potential of oxidation of copper (see column 12, lines 39-43). Neither Ye et al. nor Subramanion et al. teach the above-specified improved etching performance of an organic antireflection layer by using a specific hydrogen/nitrogen based etching chemistry, as recited in claim 1 of the instant application.

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Ye et al. teach that the silicon dioxide acts as an etch stop layer for a photoresist layer (photoresist layer 224, silicon dioxide layer 222; see column 12, lines 40-42). Ye et al. further teach using tantalum nitride as an etch stop layer for an organic based layer (organic based layer 220, tantalum nitride layer 218; see column 12, lines 42-44). However, Ye et al. do not teach the use of a silicon oxide layer as an etch stop layer for an organic antireflection layer as carried out according to the invention of the instant application.

Moreover, Ye et al. do not teach an etching profile of an organic antireflection layer being etched with hydrogen/nitrogen having an anisotropy factor of substantially 1. Ye et al. are completely silent with respect to the anisotropy factor of the organic based layer being etched with hydrogen/nitrogen. The figures of Ye et al. representing the etched organic based layer (for example Fig. 2E) are only schematic views (see column 8, lines 1-5).

Moreover, neither Ye et al. nor Subramanion et al. provide a person skilled in the art with reasonable expectation to set an etching gas composition with nitrogen and hydrogen realizing an etching process such that the rate of a vertical

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removal of a photoresist layer is less than the vertical removal of an organic antireflection layer.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 1. Claim 1 is, therefore, believed to be patentable over the art and since all of the dependent claims are ultimately dependent on claim 1, they are believed to be patentable as well.

In view of the foregoing, reconsideration and allowance of claims 1-3, 5-6, and 8-10 are solicited.

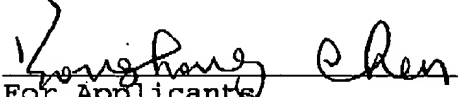
In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate a telephone call so that, if possible, patentable language can be worked out.

If an extension of time for this paper is required, petition for extension is herewith made. Please charge any fees which might be due with respect to 37 CFR Sections 1.16 and 1.17 to

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the Deposit Account of Lerner and Greenberg, P.A., No. 12-  
1099.

Respectfully submitted,

  
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